WHAT IS CLAIMED IS:

1. A method for emissions control comprising:

at a location upstream from a particulate filter or NOx trap, removing a substantial quantity of a sulfur oxide from a combustion exhaust by contacting the exhaust with a quantity of a sorbent comprising a manganese-based octahedral molecular sieve (Mn-OMS).

2. The method of claim 1 wherein the Mn-OMS has the formula $X_aMn_8O_{16}$ wherein X is selected from the group consisting of alkali metals and alkaline earth metals and a is between 0.5 and 1.5.

3. The method of claim 2 wherein X is potassium.

4. The method of claim 1 wherein the contacting is at a temperature of at least about 100°C.

5. The method of claim 4 wherein the Mn-OMS has a sulfur dioxide absorption capacity of at least about 40% by weight at the contacting temperature.

6. The method of claim 1 wherein the exhaust is from a motor vehicle.

7. The method of claim 6 wherein the exhaust is a diesel engine exhaust.

8. The method of claim 1 wherein $MnSO_4$ is formed by the contacting, the method further comprising regenerating the sorbent after the contacting by reacting the $MnSO_4$ with KOH and O_2.

9. The method of claim 1 wherein the contacting removes at least about 90% of the sulfur oxide from the exhaust.

10. The method of claim 1 wherein the Mn-OMS is formed from MO_6 octahedra connected together such that the structure generates micropores in the form of channels of AxB octahedra, wherein A and B are integers from 2 to 4.

11. The method of claim 10 wherein more than 50% of the M elements by mole are manganese.

12. The method of claim 11 wherein a cation selected from H^+, NH_4^+, Li^+, Na^+, Ag^+, K^+, Rb^+, Tl^+, Cs^+, Mg^{2+}, Ca^{2+}, Sr^{2+}, Ba^{2+}, Ra^{2+}, Cu^{2+}, Pb^{2+} is located is the channels.

13. The method of claim 12 wherein the cation is K^+.

14. The method of claim 10 wherein up to 5% of the M elements are dopant selected from copper, chromium, iron, nickel, cobalt, zinc, aluminum, gallium, titanium, tin, lead, antimony, indium, silicon, germanium, titanium and combinations thereof.

15. The method of claim 14 wherein at least 1% of the M elements are the dopant.

16. A system for emissions control comprising:

a source of a combustion exhaust stream; and

first and second emissions control devices receiving the exhaust stream;

wherein the first emission control device is upstream from the second emission control device;

wherein the first emission control device contains sorbent for removing a substantial quantity of sulfur dioxide from the exhaust stream;

wherein the sorbent comprises a manganese-based octahedral molecular sieve (Mn-OMS).

17. The system of claim 16 wherein the second emission control device is a particulate filter or NOx trap.

18. The system of claim 17 wherein the source of a combustion exhaust stream is the engine of a vehicle.

19. The system of claim 16 wherein the engine is a diesel engine.

20. The system of claim 19 wherein the sorbent has a sulfur dioxide absorption capacity greater than about 40% by weight at a temperature greater than 200°C.

21. The system of claim 16 wherein the sorbent has an Mn-OMS structure is a 2x2 structure.

22. The system of claim 16 wherein the first emission control device includes a quantity of the sorbent sufficient to remove at least about 90% of the sulfur dioxide in the exhaust stream over at least 24 hours of normal operation of the source of the combustion exhaust stream.

23. The system of claim 22 wherein the sorbent has a 2x2 structure.

24. A method for removing sulfur dioxide from a gas comprising:

removing at least about 95% of the sulfur dioxide in a gaseous stream by passing the gaseous stream through a sorbent bed, wherein the sorbent bed includes a manganese-based octahedral molecular sieve (Mn-OMS) on a support.

25. The method of claim 24 wherein the gaseous stream is less than 1 molar percent oxygen.

26. The method of claim 24 wherein the gaseous stream is substantially devoid of oxygen.

27. The method of claim 24 wherein the gaseous stream is a combustion exhaust.

28. A low emission motor vehicle comprising:

a combustion engine for powering the vehicle;

a first emission control device containing a sorbent and receiving an exhaust of the engine; and

a second emission control device downstream from the first emission control device for removing particulates and/or NO_X from the exhaust which has passed through the first emission control device;

wherein the sorbent includes a quantity of a manganese-based octahedral molecular sieve (Mn-OMS) for substantially reducing the amount of SO_2 that would otherwise enter the second emission control device.

29. The motor vehicle of claim 28 wherein the engine is a diesel engine.

30. The motor vehicle of claim 28 wherein the first emission control device includes a housing having a window for determining the color of the sorbent.

31. The motor vehicle of claim 28 wherein the sorbent has a 2x2 structure.

32. A method comprising:

substantially reducing the levels of sulfur oxides in an exhaust gas by contacting the exhaust gas with a material selected from materials with structure type OMS 2x2, OMS 2x3 and OMS 3x3, formed from MO_6 octahedra connected together such that the structure generates micropores in the form of channels, said octahedra comprising at least one element (M) selected from elements from groups IIIB, IVB, VB, VIB, VIIB, VIII, IB, IIB and IIIA of the periodic table and germanium wherein at least a major portion of element (M) is manganese, said material further comprising at least one element (B) selected from the group formed by the alkaline elements, the alkaline-earth elements, the rare earth elements, the transition metals and elements from groups IIIA, IVA of the

periodic table.

33. The method of claim 32 wherein the average valence of the metals (M) is between about +3.5 and +4.

34. The method of claim 32 wherein at least a major portion of said element (B) is selected from potassium, sodium, strontium, copper, zinc, magnesium, rubidium and calcium and mixtures of at least two of said elements.

35. The method of claim 34 wherein at least 75% of the element M is manganese.

36. An emissions control device comprising:

a housing defining an inlet and an outlet;

wherein a quantity of a sulfur oxide sorbent is contained in the housing;

wherein the sorbent comprises a manganese-based octahedral molecular sieve (Mn-OMS);

wherein the housing includes a window for monitoring the color of the sorbent.

37. The device of claim 36 wherein the inlet is coupled to an exhaust stream from the internal combustion engine of a motor vehicle.

38. A method comprising:

removing sulfur oxides from the exhaust of an internal combustion engine with an emissions control device according to claim 36; and

removing the emissions control device from the exhaust based on color change of the sorbent.